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ABSTRACT

This study replicates Siltanen's (1986) investigation of four developmental stages of metaphor comprehension and tests the effects of two levels of context on children's ability to comprehend metaphors. A total of 159 subjects ranging in age from 6 through 12 years were asked to provide an open-ended response to 16 test metaphors which varied in difficulty. The metaphors were presented either with a 60- to 100-word-story context or as simple sentences. Metaphor comprehension was operationalized as type and number of grounds used in constructing conjunctive, disjunctive, and/or relational categories when interpreting a metaphor. Children's responses were coded to indicate type of comprehension: perceptually grounded, conceptually grounded, and combined perceptually and conceptually grounded comprehension. Findings replicated Siltanen's results concerning age differences and cognitive elaboration of comprehension, and supported the four-stages theory of metaphor comprehension. However, contrary to other research, context did not significantly affect metaphor comprehension. Results are discussed in terms of metaphor difficulty, type of context, and power of the manipulation. (Author/RH)

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EFFECTS OF CONTEXT ON CHILDREN'S METAPHOR COMPREHENSION

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ABSTRACT

This study replicates Siltanen's (1986) investigation of four developmental stages of metaphor comprehension and tests the effects of two levels of context on children's metaphor comprehension. Specifically, 159 subjects ranging in age from 6-12-years were asked to provide an open-ended response to 16 test metaphors that varied in difficulty (easy, moderate, and difficulty). The metaphors were presented either with a 60-100 word story context or as simple sentences. Children's responses were then coded to indicate type comprehension (Siltanen, 1986).

Results replicated Siltanen's (1986) results and supported the four stages of metaphor comprehension. However, contrary to other research, context did not significantly affect metaphor comprehension. Results are discussed in terms of metaphor difficulty, type context, and power of the manipulation.

Research on children's metaphor comprehension flourished in the 1970's (Siltanen, 1981a). Numerous developments contributed to the increased interest in children's metaphor comprehension. First, contemporary conceptualizations of metaphor accord it greater power than previous conceptualizations (Arnheim, 1974; Verbrugge & McCarrell, 1977; Ortony, 1975,1979; Koestler, 1964; Kuhn, 1979). Second, as Honeck and Hoffman (1980), there was a movement toward emphasis upon communicative performance instead of linguistic competence. Early researchers reported that only 12-year-olds paraphrased and explained metaphors correctly (Ashe & Nerlove, 1960; Gardner, 1974; Lesser & Drouin, 1975). Critics argued, however, that the comprehension task confounded meta-cognitive skills with metaphor comprehension and that many of the test metaphors were not theoretically metaphors (Siltanen, 1986). Accordingly, researchers tested three different comprehension tasks: coding open ended responses, picture tasks, and multiple choice tests. Coding children's open ended responses, researchers reported that 2-7-year-olds provided immature, acceptable, concrete responses and that 8-11-year-olds provided mature, original, adequate responses (Smith, 1976; Malgady, 1977; Cometa & Eason, 1978). Using picture tasks, researchers found that children's ability to match pictorial sequences increased with age (Winner, Krauss, & Gardner, 1975) and that 4-5-year-olds' semantic mapping ability did not differ from adults' ability (Genter, 1977). Using multiple choice tests to measure children's metaphor comprehension, Winner, Rosenstiel, and Gardner (1976) reported that 6-9-year-olds selected interpretations with physical grounds (primitive comprehension) and that 10-14-year-

olds chose interpretations with psychological grounds (genuine comprehension). Pollio and Pollio (1979) used what they called "novel and frozen" metaphors on their multiple choice test and found that 7-14-year-olds comprehended 52-80% of the frozen and 40-60% of the novel metaphors. Using a multiple choice test also, Reynolds and Ortony (1980) founded that 7-11-year-olds comprehended metaphors and that syntax and context were confounding variables. Criticisms of this later research include: (1) many test metaphors confounded meta-linguistic skills and some were not theoretically metaphors, (2) picture tasks as valid measures of metaphor comprehension are questionable, (3) multiple choice tests as valid measures of metaphor comprehension are also questionable, and (4) with the exception of Reynolds and Ortony (1980), none of the studies provided context for test items (see Siltanen, 1981a for more detailed critique).

Arguing that critical conceptual and operational inconsistencies concerning metaphor and metaphor comprehension in previous research limit the generalizability of the results, Siltanen (1986) tested four stages of metaphor comprehension. She reasoned that metaphor is an accomodation process in that disparate tenor and vehicle create disequilibrium that is reducible by constructing a join category based on perceptual and/or conceptual grounds (Piaget, 1971). Furthermore, she argued that people construct three types of categories: conjunctive, disjunctive, and/or relational (Bruner, Goodnow, & Austin, 1956). The specific type category constructed is a function of cognitive development, preference for perceptual or conceptual

categorization, experiences with words, and metaphor difficulty. Accordingly, the four stages of metaphor comprehension differed in type metaphors comprehended (easy, moderate, and/or difficult); type grounds used in category construction (perceptual and/or conceptual); and type category constructed (conjunctive, disjunctive, and/or relational). Test metaphors were presented in an "X is Y" syntactic form, were pre-tested, and presented in a 60-100 word story context. As predicted, results indicated that 5-year-olds comprehended easy metaphors via perceptually grounded disjunctive categories; 6-8-year-olds comprehended easy and some moderate metaphors via perceptually grounded disjunctive categories; 9-11-year-olds comprehended easy, moderate, and some difficult metaphors via perceptually and some conceptually grounded categories; 12-14-year-olds comprehended easy, moderate, and difficult metaphors via perceptually and conceptually grounded disjunctive categories; 15-18-year-olds comprehended easy, moderate, and difficult metaphors via conceptually grounded conjunctive categories mostly; and 19-31-year-olds comprehended easy, moderate, and difficult metaphors via conceptually grounded conjunctive categories mostly.

Given that children's metaphor comprehension is primarily a function of metaphor difficulty and cognitive development, the role of context needs further investigation. That is, do easy metaphors need context in order to be comprehended? Do younger children need more context than older children to comprehend all metaphors regardless of difficulty? In other words, how much context is necessary to comprehend metaphors? This study addresses the above questions and replicates Siltanen's (1986)

and Reynolds aned Ortony's (1980) studies by testing the effects of metaphor difficulty, age, and context on children's metaphor comprehension. Five hypotheses were tested: (H1) 6-7-year-olds will comprehend easy and moderate metaphors by constructing perceptually or conceptually grounded disjunctive or conjunctive categories; (H2) 8-9-year-olds will comprehend easy and moderate metaphors by constructing perceptually and/or conceptually grounded disjunctive, conjunctive, or relational categories, indicating more elaborate comprehension than the 6-7-year-olds; (H3) 10-12-year-olds will comprehend easy, moderate, and some difficult metaphors by constructing perceptually and conceptually grounded disjunctive, conjunctive, and relational categories, indicating more elaborate comprehension than 6-7-year-olds and 8-9-year-olds; (H4) metaphors presented in context will produce more elaborate comprehension for 6-12-year-olds than metaphors presented in no context; (H5) younger subjects will need context to comprehend all metaphors more than older subjects; and (H6) easy metaphors will not need context while moderate and difficult metaphors will need context to facilitate comprehension.

METHOD

The subjects, 159 children ranging in age from 6-12-years, were enrolled in elementary schools and were randomly selected from those returning the permission forms.[1]

Independent Variables

The study incorporated three independent variables: age, metaphor difficulty, and context. Subjects were grouped:

(1) 6-7-year-olds, N=42; (2) 8-9-year-olds, N=59; (3) 10-12-year-olds, N=58.

Metaphor was operationalized as an "assertion that wo disparate concrete and/or abstract nouns may be included in a joint category." Metpahor difficulty was conceptualized as a function of the abstractness and concreteness of the nouns. Specifically, three levels of metaphor difficulty were manipulated: (1) low or easy - concrete tenors and vehicles; (2) moderate - concrete tenor/abstract vehicle or asbtract tenor/concrete vehicle; and (3) difficult - abstract tenors and vehicles. Metaphor difficulty of th test items was verified by 56 college students who rated 60 metaphors using two five-point Likert-type scales : (1) abstract-concrete and (2) simple-difficult. Mean ratings for metaphor difficulty levels ranged as follows: easy = 1.0-2.5; moderate = 2.7-3.5; and difficult = 3.7-5.0. To control for possible frozen or novel metaphors, the college students also rated metaphors on a novel-trite scale; highly novel (X= 4.6 - 5.0) and highly frozen (X = 1.0-1.8) metaphors were eliminated.

Context was operationalized as 60-100 words that formed a short story preceding the test metaphor.[2] Two levels of context were manipulated; with context and without context. The 16 stories and test metaphors were randomly ordered within test story books (Table 1).

INSERT TABLE 1 ABOUT HERE

Dependent Variable

Metaphor comprehension, the dependent variable, was operationalized as type (perceptual and/or conceptual) and number of grounds used in constructing conjunctive, disjunctive, and/or relational categories when interpreting a metaphor via an open-ended response task. As the coding scheme indicates, (Table 2)

INSERT TABLE 2 ABOUT HERE

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three metaphor comprehension levels were coded: perceptually grounded, conceptually grounded, and combined perceptually and conceptually grounded comprehension. This theoretically derived coding scheme (Siltanen, 1986) is sensitive to type and number of grounds a subject identifies as well as the type category constructed. It also allows for coding semantic errors, e.g., child attempts metaphor comprehension based on an incorrect understanding of a word - opiate to be open. This coding scheme provides a clearer, more specific analysis of metaphor comprehension than coding schemes used in previous research, e.g., mature-immature and primitive-genuine. Subjects' open-ended responses are used as data because they are more theoretically justifiable than the other tasks. Metaphor comprehension scores were computed by assigning numerical values[3] to subjects coded responses. Three coders attended training sessions and coded all data separately. Intercoder reliability was .90.

Procedures

Subjects were tested individually at their schools by six trained assistants and the experimenter. After a brief warm-up when the tape recorder was discussed, the tested told subjects that he/she would read some stories or sentences aloud and then they would talk about the words like the teacher does.[4] After reading a story or sentence, the tested asked two simple task involvement questions to encourage subjects to talk; then, the tested asked, "What does it mean to say ____?" Subjects were told there were no right or wrong answers and that the tester was interested in people's different interpretations. Subjects, teachers, and parents were debriefed after data collection and analysis.

Statistical Analyses

All statistical analyses were conducted at the .05 level of confidence. The data were submitted to a 3 X 3 X 2 analysis of variance with two between factors (age and context) and one within factor (metaphor difficulty).

RESULTS

Results of the 3 X 3 X 2 analysis of variance revealed no significant main effects orinteraction effects for context. However, there were significant main effects for age (F=35.06. df=2/147, $p<.000$) and for metaphor difficulty (F=136.30. df= 2/147, $p<.000$). The age by metaphor difficulty interaction was also significant (F= 8.00, df=4/294, $p< .000$). The means for this interaction are presented in Table 3.

INSERT TABLE 3 ABOUT HERE

Pillai-bartlett Trace was also significant at the $p < .000$ level. Follow up one-way analyses of variance for each metaphor difficulty level were run. The data support the general developmental pattern.

DISCUSSION

The first three hypotheses replicate Siltanen's (1986) study and are supported by these data. The 6-7-year-olds comprehended easy metaphors by constructing perceptually and conceptually grounded conjunctive categories; their moderate metaphor comprehension scores were significantly lower, indicating less elaborate metaphor comprehension. As predicted, the 8-9-year-olds comprehended easy and moderate metaphors by constructing perceptually and conceptually grounded conjunctive and relational categories. The means indicate that the 8-9-year-olds' interpretations were more elaborate than the 6-7-year-olds'. Finally, the 10-12-year-olds comprehended easy, moderate, and difficult metaphors by constructing perceptually and conceptually grounded conjunctive categories. As predicted, this group provided more elaborate interpretations of easy, moderate, and difficulty metaphors than the 6-7-year-olds and the 8-9-year-olds. However, the 10-12-year-olds did not construct as many integrated - perceptually and conceptually grounded categories as predicted. This supports Bruner, Goodnow, and Austin's (1956) contention that people generally prefer either perceptually or conceptually based categories.

Hypotheses four, five, and six were not supported. The rationale for presenting metaphors in some context is assumed obvious - people do not encounter or comprehend language in isolation. context effects were expected to increase as metaphor difficulty increased: that is, more difficult metaphors would require context to facilitate comprehension more than the easymetaphors. However, it was also expected that younger subjects would rely on context more than older subjects when comprehending all types of metaphors. Results indicate that with or without context, younger subjects comprehend easy metaphors like "butterflies are rainbows." One explanation for context not facilitating easy metaphor comprehension is that the metaphors were simply too easy - no context was necessary to comprehend them. One explanation for context not facilitating moderate and difficult metaphor comprehension is that the metaphors were too difficult and children focused on the test question. Since older subjects comprehended moderate and difficult metaphors whether presented with or without ocntext, the role of context is still unanswered. A third explanation is that the context provided was too removed and did not really provide information that would facilitate metaphor comprehension. It should be noted that extreme care was taken to exclude any words in the context that could be used in an open-ended response - perhaps too much care was taken. A fourth explanation for no context effects if that the power of the manipulation was too weak, however, a power check revealed 80-90% power for context manipulation. These results contradict Reynolds and Ortony's (1980) results.

Obviously, more research needs to be done if we are to understand the relationship between context and children's metaphor comprehension.

NOTES

[1] Special thanks to the Hattiesburg Public Schools for participating in this research.

[2] Sample story: "Fishing Fun. Yesterday, Dad took me, Joey, and his dad fishing. We got early, packed our fishing poles, bait, lunch, and were on the Mississippi River by 7:00 A.M.! Joey and I had never been fishing on the Mississippi River and boy was it fun! That river is really big. You know, the Mississippi River is a snake. Think about that - the Mississippi River is a snake.

[3] An ordinal scale was used because "the objects of a set can be rank-ordered on an operationally defined characteristic or property" (Kerlinger, F. 1973, Foundations of Behavioral Research, p. 438).

[4] Subjects were tested at their schools in an effort to enhance ecological validity (see Gibbs, 1979). The testing format was also an effort to enhance ecological validity although it is possible that the "read a story and discuss the words" format could be new to some subjects.

TABLE 1

TEST METAPHORS

Easy:

1. Raindrops are the sky's tears.
2. Butterflies are rainbows.
3. The Scioto River is a snake.
4. The moon is the earth's kite.
5. Sally's spider web is shimmering silver lace.

Moderate:

6. A circus clown is loneliness all dressed up.
7. Television is an opiate for creativity.
8. The surf crashing on the seashore is a symphony.
9. Suspicion is quicksand.
10. Trust is a relationship's glue.
11. Jealousy is a green-eyed monster.

Difficult:

12. Informers are the uranium of criminal justice.
13. Reputations are but fleeting nymphs.
14. Genius is perserverence in action.
15. Prejudice is ignorance in disguise.
16. Silence is cancer.

TABLE 2

METAPHORICAL COMPREHENSION CODING SCHEME

A = No comprehension indicated; no response or "I don't know."

B = Literal or non-metaphorical comprehension. That is, the subject might indicate that he/she actually believes that "a river is a snake" like "an apple is a fruit." Include verbatim repetition here; some comprehension is indicated.

C1 = Perceptual metaphorical comprehension based on similarity of concrete grounds such as shape, color, sound, movement, texture. However, the grounds stated are/can not be correct in your judgment.

C2 = Perceptual metaphorical comprehension based on similarity of concrete grounds as above. However, the ground stated is/can be correct in your judgment and there is only one ground identified.

C3 = Perceptual metaphorical comprehension based on similarity of concrete grounds as above. However, more than one ground is indicated and one or both of them is incorrect in your judgment.

C4 = Perceptual metaphorical comprehension based on similarity of concrete grounds as above. However, more than one bround is indicated and they are/can be correct in your judgment.

D1 = Conceptual metaphorical comprehension based on similarity of abstract grounds such as relation, function, or psychological similarity. However, the grounds indicated are/can not be correct in your judgment.

D2 = Conceptual metaphorical comprehension based on similarity of abstract grounds as above. However, only one ground is indicated and it is/can be correct in your judgment.

D3 = Conceptual metaphorical comprehension based on similarity of abstract grounds as above. However, one or both are incorrect in your judgment.

TABLE 2 CONTINUED

D4 = Conceptual metaphorical comprehension based on the similarity of abstract grounds as above. However, more than one ground is indicated and they are/can be correct in your judgment.

E1 = Perceptual and conceptual metaphorical comprehension based on concrete and abstract grounds as above. However, one or both are/can not be correct in your judgment.

E2 = Perceptual and conceptual metaphorical comprehension based on concrete and abstract grounds as above. However, only one of each is indicated and each is/can be correct in your judgment.

E3 = Perceptual and conceptual metaphorical comprehension based on concrete and abstract grounds as above. However, more than one of each is indicated and all are/can not be correct in your judgment.

E4 = Perceptual and conceptual metaphorical comprehension based on concrete and abstract grounds as above. However, more than one of each indicated and all are/can be correct in your judgment.

F = Response does not fit into any of the above categories.

TABLE 3

MEANS OF METAPHOR COMPREHENSION BY AGE AND METAPHOR DIFFICULTY

Metaphor Difficulty:	EASY	MODERATE	DIFFICULT
Age:			
6-7-years	14.60	7.73	3.07
8-9-years	17.13	12.81	6.74
10-12-years	22.60	23.80	11.61

REFERENCES

Anderson, C.(1964). The psychology of metaphor. Journal of Genetic Psychology, 105, 53-73.

Anderson, R. & Ortony, A.(1975).On putting apples into bottles: a problem of polysemy. Cognitive Psychology, 7, 167-180.

Arnheim, R.(1974). Art and visual perception: a psychology of the creative eye. Berkeley: University of California Press.

Arter, J.(1976). The effects of metaphor on reading comprehension. Unpublished doctoral dissertation, University of Illinois, at Urbana-Champaign.

Asch, S. & Nerlove, H.(1960). The development of double function terms in children: an exploratory study. In B. Kaplan & S. Wapner (Eds.), Perspectives in psychological theory. (pp.47-60). New York: International Universities Press.

Billow, R.(1975). A cognitive developmental study of metaphor comprehension. Developmental Psychology, 11, 415-423.

Black, M.(1962). Models and Metaphors. Ithaca: Cornell University Press,

Bowers, J. & Osborn,M.(1966) Attitudinal effects of selected types of concluding metaphors in persuasive speeches. Speech Monographs, 33, 147-155.

Boyd, R.(1979) Metaphor and theory change: What is "metaphor" a metaphor for? In A. Ortony (Ed.), Metaphor and thought. (pp. 356-408). New York: Cambridge University Press, 1979.

Bruner, J., Goodnow, J., & Austin, G.(1956) A study of thinking. New York: John Wiley & Son.

Burke, K.(1945). A Grammar of Motives,. Englewood Cliffs, N.J.: Prentice Hall.

Burke, K.(1935). Permanence and Change: An anatomy of purpose. New York: New Republic.

Carlson, P. & Anisfeld, M.(1969). Some observations on the linguistic competence of a two year old child. Child Development, 40, 565-575.

Chukovsky, K. (1968). From two to five. Berkeley: University of California Press.

Clark, H.(1973). The language-as-fixed-effect-fallacy: a critique of language statistics in psychological research. Journal of Verbal Learning and Verbal Behavior, 12, 335-359.

Clark, H. & ClarK, E.(1977). Psychology and Language. New York: Harcourt Brace, Jovanovich.

Cometa,H. & Eason,M. (1978).Logical operations and metaphor interpretation: a piagetian model. Child Development, 49, 649-659.

Cunningham, J.(1976). Metaphor and reading comprehension. Journal of Reading Behavior, 8,363-368.

Gardner, H.(1974). Metaphors and modalities: how children project polar adjectives onto diverse domains. Child Development, 45, 84-91.

Gardner, H., Kircher, J., Winner, E., & Perkins, D.(1975). Children's metaphoric productions and preferences. Journal of Child Language, 2, 125-141.

Gardner, H., Winner, E., Bechhofer, R., & Wolf, D.(1978). The development of figurative language. In K. Nelson (Ed.) Children's Language I. (pp.1-38). New York: Gardner Press.

Gaus, P. (1979). Recent research on children's metaphoric understanding. Paper presented at the Annual Meeting of the International Reading Association, (ERIC Document Reproduction Service, No. ED 170 725).

Genter, D. (1977), Children's performance on spatial analogies task. Child Development, 8, 1034-1039.

Ghiselin, B. (Ed).(1955). The creative process. New York: Mentor.

Gibbs, J. (1979). The meaning of ecologically oriented inquiry in contemporary psychology. American Psychologist, 34, 127-140.

Hoffman, R.(1979). On metaphors, myths, and mind. Psychological Bulletin, 29, 175-178.

Holsti, O. (1969).Content analysis for the social sciences and humanities. Reading, MA: Addison-Wesley.

Honeck, R. & Hoffman, R.(1980). (Eds.). Cognition and figurative language. Hillsdale, NJ: Erlbaum Associates.

Koestler, A.(1964). The act of creation. London: Hutchinson.

Kuhn, T.(1979). Metaphor in science. In A. Ortony (Ed). Metaphor and Thought. (pp.409-419). New York: Cambridge University Press.

Lesser, H. & Drouin, C.(1975). Training in the use of double function words. Journal of Psycholinguistic Research, 4, 285-302.

Malgady, R. (1977). Children's interpretations and appreciation of similes. Child Development, 48, 1734-1738.

Ortony, A. (1975). Why metaphors are necessary and not just nice. Educational Theory, 26, 393-398.

Ortony, A., Reynolds, R., & Arter, J.(1978). Metaphor: theoretical and empirical research. Psychological Bulletin, 85, 919-943.

Ortony, A., Schallert, D., Reynolds, R., & Antos, S.(1978). Interpreting metaphors and idioms: some effects of context on comprehension. Journal of Verbal Learning and Verbal Behavior, 17, 465-477.

Osborn, M. & Ehninger, D. (1962). The metaphor in public address. Speech Monographs, 29, 223-234.

Pepper, S.(1942). World Hypotheses. Berkeley: University of California Press.

Perrine, L.(1971). Psychological forms of metaphor. College English, 33, 125-138.

Piaget, J.(1971). The language and thought of the child. New York: World.

Pollio, M., & Pollio,H.(1974). The development of figurative language in children. Journal of Psycholinguistic Research, 3, 185-201.

Pollio, M. & Pollio, H.(1979). A test of metaphoric comprehension and some preliminary developmental data. Journal of Child Language, 6, 111-120.

Pollio, H., & Smith, M.(1979). Sense and nonsense in thinking about anomally and metaphor. Psychonomic Society Bulletin, 13, 323-326.

Reinsch, N.(1971). An investigation of the effects of metaphor and simile in persuasive discourse. Speech Monographs, 38, 142-145.

Reinsch, N. (1974). Figurative language and source credibility: a preliminary investigation and reconceptualization. Human Communication Research, 1, 75-80.

Reynolds, R. & Ortony, A.(1980). Some issues in the measurement of children's comprehension of metaphorical language. Technical Report #172. Center for the study of reading, University of Illinois, Urbana-Champaign.

Richards, I.(1936). The philosophy of rhetoric. New York: Oxford University Press.

Shibles, W. (1971). Metaphor: An Annotated Bibliography. Whitewater, WI.: The Language Press.

Siltanen, S. (1981a). Apple noses and popsicle toeses: a developmental investigation of metaphor comprehension. Presented Speech Communication Association Convention, Anaheim, CA.

_____, (1981b). The persuasiveness of metaphor: a replication and extension. Southern Speech Communication Journal, 67, 67-83.

_____, (1984). Toward a theory based metaphor comprehension coding scheme. Presented at the Southern Speech Communication Convention, Baton Rouge, LA

_____, (1986). Butterflies are rainbows? A Developmental investigation of children's metaphor comprehension. Communication Education, 35. 1-12.

Smith, J. (1976). Children's comprehension of metaphor: a piagetian interpretation. Language and Speech, 19, 236-243.

Verbrugge, R. & McCarrell, N. (1977). Metaphoric comprehension: studies in reminding and resembling. Cognitive Psychology, 9, 494-533.

Werner, H. (1957). The concept of development from a comparative and organismic point of view. In D. Harris (ED). The concept of development: an issue in the study of human behavior. (pp. 125-148). Minneapolis: University of Minnesota Press.

Wheelwright, P. (1968). The Burning Fountain. Bloomington: Indiana University Press.

Wike, E. & Church, J. (1976). Comments on Clark's "The Language-as-fixed-effect- fallacy." Journal of Verbal Learning and Verbal Behavior, 15, 249-255.

Winner, E., Rosenstiel, A., & Gardner, H.(1976). The development of metaphoric understanding, Developmental Psychology, 12, 289-297.

Winner, E., & Gardner, H.(1977). What does it take to understand metaphor? Paper presented at the Symposium on metaphor and analogy at the Society for Research in Child Development, New Orleans, Louisiana, (ERIC Document Reproduction Service No. ED 139 011).

Winner, E., Engle, M., & Gardner, H.(1980). Misunderstanding metaphor: what's the problem? Journal of Experimental Psychology, 30, 22-32.

Winner, E.(1979). New names for old things - emergence of metaphoric language. Journal of Child Language, 6, 469-492.

Winner, E., Krauss, B., Gardner, H.(1975). Children's capacity to perceive metaphoric relationships. Unpublished paper, Harvard University.